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Abstract

UTILIZATION OF THE HIGH FLUX REACTOR AT PETTEN

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The 20 MW High Flux Reactor (H.F.R.) is owned by the European Atomic Energy Community (Euratom), as part of its research establishment at Petten. The reactor is operated by the Netherlands nuclear energy organization, Reactor Centrum Nederland (R.C.N.), and used jointly by Euratom and R.C.N. Both parties co-operate with other organizations in the execution of experiments. As regards Euratom, these are mainly organizations in the other five countries of Euratom.

R.C.N. carries out a number of experiments of its own, and also some in co-operation with the Norwegian Institutt for Atomenergi (I.F.A.). Other experiments are done by R.C.N. under contract. Some of the beamholes have been made available for nuclear physics experiments to University teams working under the auspices of the Netherlands' Organization for the Fundamental Investigation of Matter (F.O.M.).

The organizational aspects of the use of the reactor by several parties will be discussed, after which the more important experiments will be described.

Five of the horizontal beamtubes are at present used for neutron physics research. All of them are equipped with standard collimators. Two of the beams are used for neutron diffraction research (I.F.A./R.C.N.), one utilizing polarized neutrons and the other one being equipped with a powder and a single crystal spectrometer. Two beamtubes are used for capture gamma ray experiments (F.O.M.), and in one beam research on the inelastic scattering of thermal neutrons (I.F.A./R.C.N.) is carried out. The majority of the experiments in or near the fuel region of the core is of

the so-called instrumented capsule-type, others are carried out in loops. The majority of these irradiation experiments aims at the investigation of non-fissile materials, a smaller number is for reactor fuel research.

R.C.N. carries out two uranium oxide fuel irradiation experiments in loops: one is a low pressure facility (used together with I.F.A.), while the other one is a pressurized water loop for the investigation of prototype fuel elements for the NERO ship propulsion project. Euratom carries out a number of fuel investigations in instrumented capsules: uranium oxide fuel pencils are irradiated in the poolside facility of the reactor, while another rig is used for uranium carbide research.

Graphite irradiations are performed for several organizations. R.C.N. has developed equipment for the O.E.C.D. Dragon project in which graphite samples are irradiated at 600, 900 and 1200°C. Euratom performs graphite irradiations both for its own programme and for third parties. Pressure vessel steels are investigated under an I.F.A./R.C.N. joint project; at low temperatures in non-instrumented equipment and at elevated temperatures in a loop using an organic coolant. Stainless steels are being irradiated by Euratom. Other reactor positions are used for the investigation of a large variety of materials such as beryllium, beryllia, thermo-couples, zircaloy, strain gauges, and zirconium hydride. The reactor is also used for the production of radioisotopes for commercial uses or for research. Standard irradiation facilities are available for that purpose.